PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents
United States Patent and Trademark Office
Box PCT
Washington, D.C.20231
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 15 August 2000 (15.08.00)	
International application No. PCT/FI99/01034	**Applicant's or agent's file reference** PPC10809/SAV
International filing date (day/month/year) 15 December 1999 (15.12.99)	**Priority date** (day/month/year) 18 December 1998 (18.12.98)
Applicant SIEVÄNEN, Mikko et al	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

13 July 2000 (13.07.00)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer Charlotte ENGER
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference PPC10809/SAV	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/FI99/01034	International filing date *(day/month/year)* 15.12.1999	Priority date *(day/month/year)* 18.12.1998
International Patent Classification (IPC) or national classification and IPC7 A63F 1/04		
Applicant SYSTEM-300 GROUP OY et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
13.07.2000	03.04.2001
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Telex 17978 PATOREG-S Facsimile No. 08-667 72 88	Authorized officer Hans Nordström/js Telephone No. 08-782 25 00

Form PCT/IPEA/409 (cover sheet) (January 1998)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/FI99/01034

I. Basis of the report

1. With regard to the **elements** of the international application:*

☒ the international application as originally filed

☐ the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

☐ the claims:
pages _____, as originally filed
pages _____, as amended (together with any statement) under article 19
pages _____, filed with the demand
pages _____, filed with the letter of _____

☐ the drawings:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

☐ the sequence listing part of the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language English which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☒ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheet/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2 (c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.*

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/FI99/01034

V. **Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-10	YES
	Claims		NO
Inventive step (IS)	Claims		YES
	Claims	1-10	NO
Industrial applicability (IA)	Claims	1-10	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

GB 1420009 A (AVIONS MARCEL DASSALUT-BREGUET AVIATION), 7 January 1976 (07.01.76) (a)

US 5738924 A (SING), 14 April 1998 (14.04.98) (b)

GB 2197850 A (FISCHER GESELLSCHAFT M.B.H), 2 June 1988 (02.06.88) (c)

US 4320898 A (BRUNSET ET AL), 23 March 1982 (23.09.82) (d)

The claimed invention relates to a construction element for a bowling lane, which is intended as a surface board of the bowling lane and which comprises a supporting structure layer. The object of the invention is to realize a light and cheap bowling lane, which is easy to assemble. The solution according to the invention is that the supporting structure layer is a cellular structure. The claimed invention also relates to a bowling lane.

Document (a) reveals a light construction element for a floor in which a supporting structure layer is a cellular structure. The supporting layer is covered by layers 3 and 4. Also see document (b) the cellular supporting structure layer 16, covered by layers 12,14, document (c) the cellular supporting structure layer 4, covered by layers 1-3. To apply this art to a surface board of a bowling lane is considered to be obvious to a person skilled in the art. Therefore claim 1 is considered to lack an inventive step.

.../...

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Box V

The invention according to claims 2 and 7 is known per se from documents (a)-(c). Claims 2 and 7 lack an inventive step.

The invention according to claims 3 and is known per se from documents (a) and (b) and claim 3 lacks an inventive step.

The invention according to claim 4 and is known per se from documents (a)-(c) and claim 4 lacks an inventive step.

The invention according to claim 5 and is known per se from document (b) and claim 5 lacks an inventive step.

Claim 6 is considered to deal with obvious matters of design and lacks an inventive step.

The invention according to claim 8 and is known per se from documents (b) and (c) and claim 8 lacks an inventive step.

Document (d) reveals a bowling lane comprising a substructure 48. Adjacent construction elements 41-46 are placed directly on top of the substructure and forms the only layer. It is considered to be obvious to a person skilled in the to provide the construction element with a cellular supporting structure known per se from documents (a)-(c). Claim 9 is considered to lack an inventive step.

Claim 10 is considered to deal with obvious matters of design. Claim 10 lacks an inventive step.

WO 00/37151
PCT/FI99/01034

PATENT COOPERATION TREATY

07. 07

From the INTERNATIONAL BUREAU

PCT

To:
TAMPEREEN PATENTTITOIMISTO OY
Hermiankatu 6
FIN-33720 Tampere
FINLANDE

NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

Date of mailing (day/month/year) 29 June 2000 (29.06.00)	
Applicant's or agent's file reference PPC10809/SAV	**IMPORTANT NOTICE**
International application No. PCT/FI99/01034	**International filing date** (day/month/year) 15 December 1999 (15.12.99)
Priority date (day/month/year) 18 December 1998 (18.12.98)	
Applicant SYSTEM-300 GROUP OY et al	

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:
   AU,CN,JP,KP,KR,US

   In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:
   AE,AL,AM,AP,AT,AZ,BA,BB,BG,BR,BY,CA,CH,CR,CU,CZ,DE,DK,DM,EA,EE,EP,ES,FI,GB,GD,GE,
   GH,GM,HR,HU,ID,IL,IN,IS,KE,KG,KZ,LC,LK,LR,LS,LT,LU,LV,MA,MD,MG,MK,MN,MW,MX,NO,NZ,
   OA,PL,PT,RO,RU,SD,SE,SG,SI,SK,SL,TJ,TM,TR,TT,TZ,UA,UG,UZ,VN,YU,ZA,ZW
   The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on
   29 June 2000 (29.06.00) under No. WO 00/37151

REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, **a demand for international preliminary examination** must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the **national phase**, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer
J. Zahra

Telephone No. (41-22) 338.83.38

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 99/01034

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: A63D 1/04
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: A63D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 1420009 A (AVIONS MARCEL DASSAULT-BREGUET AVIATION), 7 January 1976 (07.01.76), column 2, line 3 - line 60, figure 1	1-8
Y		9,10
	--	
X	GB 1328562 A (ÖSTERREICHISCHE DOKA SCHALUNGS- UND GERUSTUNGSTECHNIK GESELLSCHAFT M.B.H.), 30 August 1973 (30.08.73), column 2, line 109 - column 3, line 13, figure 1	1,2,4-8
Y		9,10
	--	

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" erlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
22 March 2000	28 -03- 2000
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Hans Nordström / JA A Telephone No. +46 8 782 25 00

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 99/01034

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2035895 A (M.E. RUSHTON), 25 June 1980 (25.06.80), figures 4,5, abstract	1,2,4-8
Y		9,10
	--	
X	GB 2197820 A (FISCHER GESELLSCHAFT M.B.H.), 2 June 1988 (02.06.88), page 3, line 25 - page 4, line 4, figure 1, abstract	1,2,4-8
Y		9,10
	--	
X	US 5738924 A (SING), 14 April 1998 (14.04.98), figure 4C, abstract	1-8
Y		9,10
	--	
Y	US 4320898 A (BRUNST ET AL), 23 March 1982 (23.03.82), abstract	9-10
A		1-8
	--	
A	US 4311177 A (KELLY), 19 January 1982 (19.01.82)	1-10
	--	
A	US 4205843 A (MURREY, SR.), 3 June 1980 (03.06.80)	1-10
	--	

INTERNATIONAL SEARCH REPORT

Information on patent family members

02/12/99

International application No.
PCT/FI 99/01034

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 1420009 A	07/01/76	DE 2316061 A	11/10/73
		FR 2177640 A,B	09/11/73
		US 3886023 A	27/05/75
GB 1328562 A	30/08/73	AT 298013 A,B	15/03/72
		CH 516713 A	15/12/71
		DE 2037922 A	22/07/71
		FR 2059429 A	28/05/71
		SE 368848 B	22/07/74
		AT 292991 A,B	15/08/71
		CH 516719 A	15/12/71
		DE 2037923 A	11/03/71
GB 2035895 A	25/06/80	NONE	
GB 2197820 A	02/06/88	AT 360983 A	15/03/87
		AT 384189 A,B	12/10/87
		DE 3625534 A	11/02/88
		FR 2607442 A	03/06/88
		US 4759964 A	26/07/88
US 5738924 A	14/04/98	AU 697396 B	08/10/98
		AU 1681495 A	15/08/95
		CA 2180553 A	03/08/95
		CN 1139404 A	01/01/97
		EP 0741638 A	13/11/96
		JP 9508329 T	26/08/97
		WO 9520486 A	03/08/95
US 4320898 A	23/03/82	NONE	
US 4311177 A	19/01/82	NONE	
US 4205843 A	03/06/80	NONE	

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : A63D 1/04 — A1

(11) International Publication Number: WO 00/37151

(43) International Publication Date: 29 June 2000 (29.06.00)

(21) International Application Number: PCT/FI99/01034

(22) International Filing Date: 15 December 1999 (15.12.99)

(30) Priority Data:
982743 18 December 1998 (18.12.98) FI

(71) Applicant *(for all designated States except US)*: SYSTEM-300 GROUP OY [FI/FI]; Osuusmyllynkatu 5, FIN-33700 Tampere (FI).

(72) Inventors; and

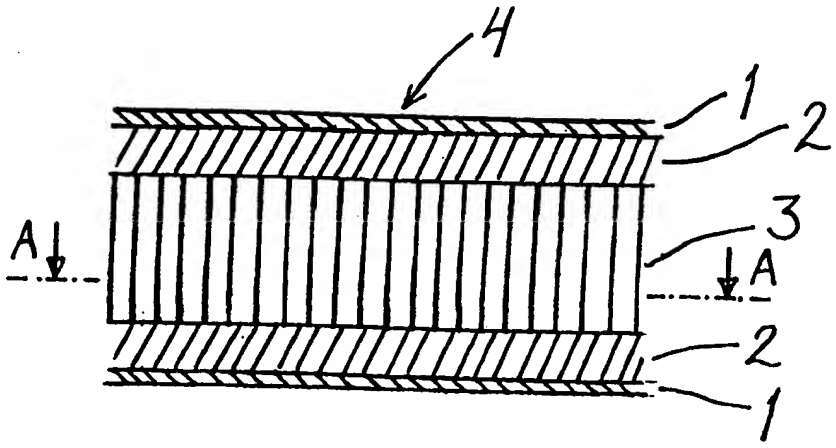
(75) Inventors/Applicants *(for US only)*: SIEVÄNEN, Mikko [FI/FI]; Kääniementie 40, FIN-34240 Kämmenniemi (FI). HIETALA, Joni [FI/FI]; Parkanonkatu 11 B 13, FIN-33720 Tampere (FI). JÄRVELÄ, Pentti [FI/FI]; Mestarinkatu 12, FIN-33720 Tampere (FI).

(74) Agent: TAMPEREEN PATENTTITOIMISTO OY; Hermiankatu 6, FIN-33720 Tampere (FI).

(81) Designated States: AE, AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), DM, EE, EE (Utility model), ES, FI, FI (Utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.
In English translation (filed in Finnish).

(54) Title: A CONSTRUCTION ELEMENT FOR A BOWLING LANE AND A BOWLING LANE



(57) Abstract

A construction element (4) for a bowling lane is intended as a surface board of the bowling lane and it comprises at least one laminate layer (1), a board layer (2) and a supporting structure layer (3). The supporting structure layer (3) is a cellular structure of a honeycomb shape.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	**ES**	Spain	**LS**	Lesotho	**SI**	Slovenia
AM	Armenia	**FI**	Finland	**LT**	Lithuania	**SK**	Slovakia
AT	Austria	**FR**	France	**LU**	Luxembourg	**SN**	Senegal
AU	Australia	**GA**	Gabon	**LV**	Latvia	**SZ**	Swaziland
AZ	Azerbaijan	**GB**	United Kingdom	**MC**	Monaco	**TD**	Chad
BA	Bosnia and Herzegovina	**GE**	Georgia	**MD**	Republic of Moldova	**TG**	Togo
BB	Barbados	**GH**	Ghana	**MG**	Madagascar	**TJ**	Tajikistan
BE	Belgium	**GN**	Guinea	**MK**	The former Yugoslav Republic of Macedonia	**TM**	Turkmenistan
BF	Burkina Faso	**GR**	Greece			**TR**	Turkey
BG	Bulgaria	**HU**	Hungary	**ML**	Mali	**TT**	Trinidad and Tobago
BJ	Benin	**IE**	Ireland	**MN**	Mongolia	**UA**	Ukraine
BR	Brazil	**IL**	Israel	**MR**	Mauritania	**UG**	Uganda
BY	Belarus	**IS**	Iceland	**MW**	Malawi	**US**	United States of America
CA	Canada	**IT**	Italy	**MX**	Mexico	**UZ**	Uzbekistan
CF	Central African Republic	**JP**	Japan	**NE**	Niger	**VN**	Viet Nam
CG	Congo	**KE**	Kenya	**NL**	Netherlands	**YU**	Yugoslavia
CH	Switzerland	**KG**	Kyrgyzstan	**NO**	Norway	**ZW**	Zimbabwe
CI	Côte d'Ivoire	**KP**	Democratic People's Republic of Korea	**NZ**	New Zealand		
CM	Cameroon			**PL**	Poland		
CN	China	**KR**	Republic of Korea	**PT**	Portugal		
CU	Cuba	**KZ**	Kazakstan	**RO**	Romania		
CZ	Czech Republic	**LC**	Saint Lucia	**RU**	Russian Federation		
DE	Germany	**LI**	Liechtenstein	**SD**	Sudan		
DK	Denmark	**LK**	Sri Lanka	**SE**	Sweden		
EE	Estonia	**LR**	Liberia	**SG**	Singapore		

A construction element for a bowling lane and a bowling lane

The present invention relates to a bowling lane and a construction element of the same. Said construction element comprises a laminate layer, a board layer as well as a supporting structure layer.

Typically, bowling lanes are composed of a substructure and boards attached thereto or of wood strips attached to each other. The substructure is usually a trussed construction made of wood beams. Typically, there are several boards placed on top of each other so that the required strength properties are attained. If the surface material of the lane is synthetic material instead of wood, a laminate layer is typically attached on the outer surface of the topmost board. The boards are mounted on the substructure by means of screws in such a manner that in the direction of the lane the difference in levels of the joints between the elements may be 0.635 mm (1/40") at the most.

The bowling lane is composed of an approach, a ball track and a pin deck. Different parts of the bowling lane require different qualities, which have to be taken into account when the lane is designed. By the approach, the lane has to endure e.g. the weight of the bowler, and as far as the ball track and the pin deck are concerned, impact resistance and the friction on the surface of the lane are important features.

Known bowling lanes and construction elements of bowling lanes are discussed for example in patents of General Electric Co US 4231573, US4307883, US4320898, US 4337290, US 4379553, US 4456253 and US 4599124 as well as US 4205842. The applicant of this patent also manufactures bowling lanes by applying a particular method.

The patents US 4231573, US4307883, US 4337290, US 4379553, US 4456253 and US 4599124 all introduce a similar construction in which the laminate is fixed on a bottom plate, whereby the topmost construction element of the bowling lane is formed. The material of the laminates and/or bottom plates varies to some extent, for example in the patent US 4379553 the laminate is fireproof and in the patent US 4231573 concrete is suggested as a bottom plate. Typically the bottom

plates used are wood-based boards. The patent US 4456253 discloses a two-sided construction element which can be turned around when the surface which is used is worn out.

The patent US 4320898 discloses a somewhat different solution for a construction element of a bowling lane. The inner part of the construction element is composed of wood strips which are attached to each other by means of glue or nails. The humidity of the wood strips in the inner part is standardized and the inner part is closed from the environment by means of a laminate attached on the outer surfaces as well as a moisture barrier attached to the corners. The construction element can be attached directly on top of the substructure.

The patent US 4205842 discloses a bowling lane solution in which the ball track is formed of fibre board on top of which a laminate is attached. On the approach lane as well as on the pin deck the laminate is attached on rigid boards which can be made of *e.g.* aluminum.

At present, the applicant of this patent manufactures bowling lanes in such a way that two superimposed MDF boards are attached on top of a trussed construction made of wood beams, as well as a high pressure laminate board which is made of paper impregnated with resin. The term MDF board refers to a board in which the wood-based construction parts, for example the fibres and wood chips, are treated with an adhesive medium, thus forming a mat, whereafter it is pressed in the form of boards by means of pressure and heat.

The MDF boards are placed on top of the truss in such a way that the joint of the boards in the first board layer is situated in a different location than the joint of the boards in the second boards layer. Thus, weak spots do not occur in the construction.

The problems of known construction elements of bowling lanes include complexity of installation, heavy elements, relatively high price of the elements as well as poor sales value due to the complexity of the installation/disassembly. The construction of the bowling lanes is not optimized either, but known bowling lane constructions comprise

components which are substantially too durable with respect to the target of use, which components, however, easily react to changes in climate conditions. On the other hand, the different parts of the lane require different qualities, and thus, a completely equal lane construction is not the best possible one all over the lane.

The purpose of the bowling lane element according to the invention is to avoid the problems of known bowling lane constructions. The bowling lane element according to the invention will be characterized in what will be presented in the characterizing part of the appended claim 1.

The bowling lane element according to the invention is light, cheap and it can be easily disassembled, assembled and transferred, wherein it also possesses resale value. It endures humidity and temperature changes better than known bowling lane constructions.

By using said elements, it is also possible to build bowling lanes for temporary use, *e.g.* for happenings which last only a fixed period of time. The elements can also be constructed in such a way that they can be used either side facing upward, and thus, the elements can be turned when the other side has worn out and become unusable.

Superimposed boards are not necessary, but the bowling lane element can be fixed directly on top of the substructure. The substructure of the lane element can be made lighter in weight, because the elements are more rigid and they exert a substantially smaller stress on the substructure than known solutions. Similarly, by altering the thickness of different layers of the bowling lane element while keeping the overall thickness of the element constant, a suitable construction in view of the requirements of different lane sections is attained.

In the following, the bowling lane and the bowling lane element according to the invention will be described in more detail by means of an example and with reference to the appended drawings:

Fig. 1 shows the structure of a bowling lane element.

Fig. 2 shows the structure of a cellular board in a cross-section A-A of Fig. 1.

Fig. 3 shows a side-view of the structure of the bowling lane.

A bowling lane with all its devices is quite a complex construction, which, in addition to the lane, includes a ball return system and a pin setting apparatus. This example, however, only discusses the structure of the actual bowling lane.

A bowling lane element according to Fig. 1, to which reference is made in its entirety by reference numeral 4, is formed of a laminate layer 1, a board layer 2, and a supporting structure layer 3. In the example, the laminate layer 1 is a high pressure laminate, the board layer 2 is a wood-based board and the supporting structure layer 3 is a cellular board.

The high pressure laminate 1 constitutes the actual surface structure, as it is an impact resistant and sufficiently hard and stiff layer with good friction and abrasion properties. Underneath the laminate 1, a wood-based board 2, preferably made of high-density chipboard, constitutes a layer which endures impact stress. The density of this chipboard is advantageously over 1000 kg/m^3. The cellular board 3 has a high specific stiffness, and it endures well the changes in climatic conditions (heat, humidity). It is also a light-weighted structure, which substantially decreases the mass of the lane element.

The laminate 1 is made of multilayer paper impregnated with resin, and it is fixed on the wood-based board 2 which is 5 to 30 mm thick. The thickness of the laminate varies in different sections of the lane, for example by the pin deck the laminate 1 is thicker, whereas the wood-based board 2 and/or the cellular board 3 has to be thinner so that the overall thickness of the lane element 4 equals the thickness of the other lane elements, because otherwise the installation of the elements becomes unreasonably difficult. When the bowling lane is dimensioned, the starting point is that when the element is loaded with a mass of

300 kg, it must not bend more than 1.016 mm (4/100"), if a span length of 1 m is used in the substructure.

The laminate 1, the wood-based board 2 and the cellular board 3 are attached to each other by means of an adhesive medium. The adhesive medium, which has to be high-modulus and very durable, can be in a form of a solution, paste or film.

According to Fig. 2, the cellular board 3 is composed of a wall 5 which separates cells 6 which are attached to each other wall to wall. The wall 5 is made of aluminium. The thickness of the cellular board varies between 10 and 30 mm, and the diameter of the cells can vary in the area of 5 to 15 mm. Standard dimensions are 6.35 mm (1/4") or 9.525 mm (3/8"). In the bowling lane element 4 according to this example, the cellular board contains cells which are hexagonal, so-called honeycombs. By means of the honeycomb structure it is possible to attain substantially equal strength properties irrespective of the direction.

The bowling lane element 4 can be constructed as a mirror image in such a way that on both sides of the cellular board 3 there is a wood-based board 2, on the outer surface of which there is a laminate 1. By means of such a structure a substantially strainless construction is attained which remains in its original shape. At the same time the advantage is attained that the board can be turned, if necessary. The sides of the bowling lane element 4 can be closed so that they become air-tight and the changes in humidity and temperature do not affect the bowling lane element 4.

Fig. 3 shows a bowling lane, which is installed on a concrete floor 7. The substructure of the lane is made of wood beams 8 of 45 x 95 mm, on top of which beams 9 are placed at regular intervals, the beams being I-beams made of wood in this case. The bowling lane element 4 is fixed to the beams 9. Adjacent bowling lane elements 4 are fixed on top of the substructure without the underlying boards to form a single uniform board layer.

When compared to a bowling lane made of laminate and MDF boards, the bowling lane constructed of construction elements 4 according to the invention has a considerably smaller mass. If the construction element 4 contains an aluminium cellular board, with a thickness of 25.4 mm (1") and the diameter of the cells is 6.35 mm (1/4"), and a wood-based board (thickness 10mm) made of high-density chipboard on both sides of the cellular board, as well as a laminate board (thickness 3.175 mm), the mass of the element of 3.3 m^2 becomes approximately 100 kg. A corresponding surface area constructed of two MDF boards and a laminate board weighs 195 kg.

The cellular structure also makes it possible *e.g.* to add a substance in the cell. One alternative is to place polyurethane in the cells to improve sound insulation.

It is obvious for anyone skilled in the art that the invention is not restricted solely to the above example, but it can vary within the scope of the claims hereinbelow. The cross-section of the cells in the cellular board can, for example, have the shape a square or an octagon. The cellular board can also be made of a material other than aluminium. It is also possible that several separate pieces with a cellular structure constitute the supporting structure layer. It is typical for all of these that the walls 5 of the cellular structure are substantially transverse to the plane of the board layers, i.e. they stand erect between the horizontal board layers 3. As a substructure of the bowling lane it is possible to use a structure other than the above-presented beam structure.

Claims:

1. A construction element (4) for a bowling lane, which is intended as a surface board of the bowling lane and which comprises at least one laminate layer (1), a board layer (2) and a supporting structure layer (3), **characterized** in that the supporting structure layer (3) is a cellular structure made of one or more pieces.

2. The construction element (4) according to the foregoing claim 1, **characterized** in that the supporting structure layer (3) is a board-like material comprising a wall (5) which separates cells (6) attached to each other wall to wall.

3. The construction element (4) according to any of the foregoing claims, **characterized** in that the cross-section of the cell (6) is shaped as a regular hexagon.

4. The construction element (4) according to any of the foregoing claims, **characterized** in that the material of the supporting structure layer (3) is aluminium.

5. The construction element (4) according to any of the foregoing claims, **characterized** in that the board layer (2) is a wood-based board.

6. The construction element (4) according to any of the foregoing claims, **characterized** in that the laminate layer (1) is made of paper impregnated with resin and composed of one or more layers.

7. The construction element (4) according to any of the foregoing claims, **characterized** in that the laminate layer (1), the board layer (2) and the supporting structure layer (3) are fixed together permanently.

8. The construction element (4) according to any of the foregoing claims, **characterized** in that the construction element is constructed to be mirror symmetrical in such a way that on both sides of the

supporting structure layers (3) there is a board layer (2), and on the outer surface of both board layers (2) there is a laminate layer (1).

9. A bowling lane which comprises a substructure which is made of beams (8, 9) and construction elements (4) according to claim 1, **characterized** in that the adjacent construction elements (4) form the only board layer on top of the substructure in the bowling lane.

10. The bowling lane according to claim 9, **characterized** in that the layers (1, 2, 3) of the construction elements (4) of the bowling lane have a different thickness in different sections of the bowling lane in such a way that the overall thickness of the construction elements (4) remains constant on the entire lane.

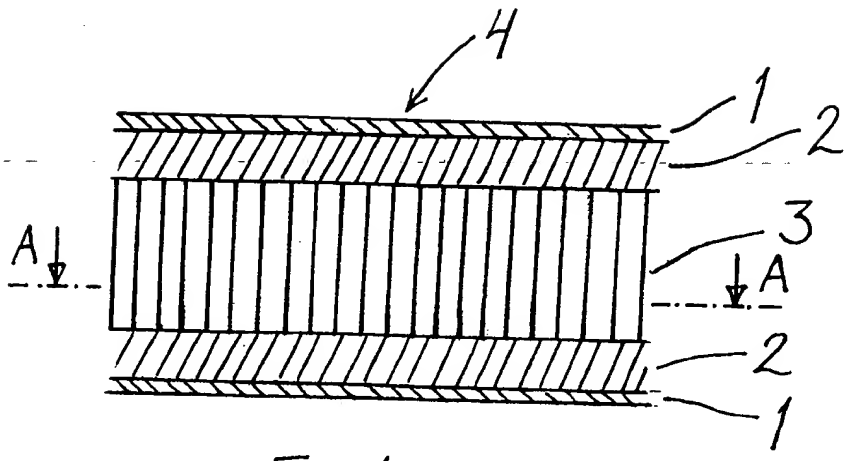


Fig. 1

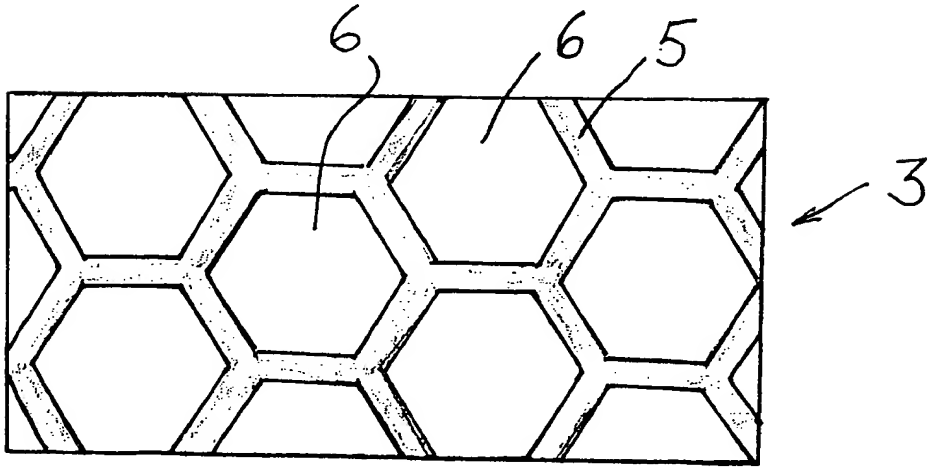


Fig. 2

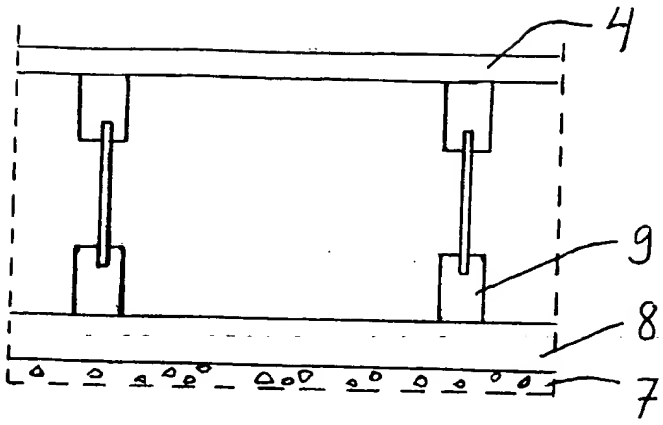


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 99/01034

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: A63D 1/04
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: A63D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 1420009 A (AVIONS MARCEL DASSAULT-BREGUET AVIATION), 7 January 1976 (07.01.76), column 2, line 3 - line 60, figure 1	1-8
Y	--	9,10
X	GB 1328562 A (ÖSTERREICHISCHE DOKA SCHALUNGS- UND GERUSTUNGSTECHNIK GESELLSCHAFT M.B.H.), 30 August 1973 (30.08.73), column 2, line 109 - column 3, line 13, figure 1	1,2,4-8
Y	--	9,10

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" erlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
22 March 2000	28 -03- 2000
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Hans Nordström / JA A Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 99/01034

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2035895 A (M.E. RUSHTON), 25 June 1980 (25.06.80), figures 4,5, abstract	1,2,4-8
Y		9,10
	--	
X	GB 2197820 A (FISCHER GESELLSCHAFT M.B.H.), 2 June 1988 (02.06.88), page 3, line 25 - page 4, line 4, figure 1, abstract	1,2,4-8
Y		9,10
	--	
X	US 5738924 A (SING), 14 April 1998 (14.04.98), figure 4C, abstract	1-8
Y		9,10
	--	
Y	US 4320898 A (BRUNST ET AL), 23 March 1982 (23.03.82), abstract	9-10
A		1-8
	--	
A	US 4311177 A (KELLY), 19 January 1982 (19.01.82)	1-10
	--	
A	US 4205843 A (MURREY, SR.), 3 June 1980 (03.06.80)	1-10
	--	

INTERNATIONAL SEARCH REPORT

Information on patent family members

02/12/99

International application No.
PCT/FI 99/01034

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 1420009 A	07/01/76	DE 2316061 A	11/10/73
		FR 2177640 A,B	09/11/73
		US 3886023 A	27/05/75
GB 1328562 A	30/08/73	AT 298013 A,B	15/03/72
		CH 516713 A	15/12/71
		DE 2037922 A	22/07/71
		FR 2059429 A	28/05/71
		SE 368848 B	22/07/74
		AT 292991 A,B	15/08/71
		CH 516719 A	15/12/71
		DE 2037923 A	11/03/71
GB 2035895 A	25/06/80	NONE	
GB 2197820 A	02/06/88	AT 360983 A	15/03/87
		AT 384189 A,B	12/10/87
		DE 3625534 A	11/02/88
		FR 2607442 A	03/06/88
		US 4759964 A	26/07/88
US 5738924 A	14/04/98	AU 697396 B	08/10/98
		AU 1681495 A	15/08/95
		CA 2180553 A	03/08/95
		CN 1139404 A	01/01/97
		EP 0741638 A	13/11/96
		JP 9508329 T	26/08/97
		WO 9520486 A	03/08/95
US 4320898 A	23/03/82	NONE	
US 4311177 A	19/01/82	NONE	
US 4205843 A	03/06/80	NONE	

RECORD COPY

PCT REQUEST

PPC10809/SAV

Original (for **SUBMISSION**) - printed on 14.12.1999 10:30:40 AM

0	**For receiving Office use only**	
0-1	International Application No.	PCT/FI 9 9 / 0 1 0 3 4
0-2	International Filing Date	1 5 DEC 1999 (15. 12. 99)
0-3	Name of receiving Office and "PCT International Application"	The Finnish Patent Office PCT International Application
0-4	**Form - PCT/RO/101 PCT Request**	
0-4-1	Prepared using	PCT-EASY Version 2.90 (updated 01.07.1999)
0-5	**Petition** The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty	
0-6	**Receiving Office (specified by the applicant)**	National Board of Patents and Registration (Finland) (RO/FI)
0-7	**Applicant's or agent's file reference**	PPC10809/SAV
I	**Title of invention**	A CONSTRUCTION ELEMENT FOR A BOWLING LANE AND A BOWLING LANE
II	**Applicant**	
II-1	This person is:	applicant only
II-2	Applicant for	all designated States except US
II-4	Name	SYSTEM-300 GROUP OY
II-5	Address:	Osuusmyllynkatu 5 FIN-33700 TAMPERE Finland
II-6	State of nationality	FI
II-7	State of residence	FI
III-1	**Applicant and/or inventor**	
III-1-1	This person is:	applicant and inventor
III-1-2	Applicant for	US only
III-1-4	Name (LAST, First)	SIEVÄNEN, Mikko
III-1-5	Address:	Kääniementie 40 FIN-34240 KÄMMENNIEMI Finland
III-1-6	State of nationality	FI
III-1-7	State of residence	FI

PCT REQUEST

PPC10809/SAV

Original (for **SUBMISSION**) - printed on 14.12.1999 10:30:40 AM

III-2	**Applicant and/or inventor**	
III-2-1	This person is:	applicant and inventor
III-2-2	Applicant for	US only
III-2-4	Name (LAST, First)	HIETALA, Joni
III-2-5	Address:	Parkanonkatu 11 B 13 FIN-33720 TAMPERE Finland
III-2-6	State of nationality	FI
III-2-7	State of residence	FI
III-3	**Applicant and/or inventor**	
III-3-1	This person is:	applicant and inventor
III-3-2	Applicant for	US only
III-3-4	Name (LAST, First)	JÄRVELÄ, Pentti
III-3-5	Address:	Mestarinkatu 12 FIN-33720 TAMPERE Finland
III-3-6	State of nationality	FI
III-3-7	State of residence	FI
IV-1	**Agent or common representative; or address for correspondence** The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:	agent
IV-1-1	Name	TAMPEREEN PATENTTITOIMISTO OY
IV-1-2	Address:	Hermiankatu 6 FIN-33720 TAMPERE Finland
IV-1-3	Telephone No.	+358-3-288 6111
IV-1-4	Facsimile No.	+358-3-288 6262
IV-1-5	e-mail	tampat@patentti.elisa.fi
V	**Designation of States**	
V-1	Regional Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	AP: GH GM KE LS MW SD SL SZ TZ UG ZW and any other State which is a Contracting State of the Harare Protocol and of the PCT EA: AM AZ BY KG KZ MD RU TJ TM and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT EP: AT BE CH&LI CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE and any other State which is a Contracting State of the European Patent Convention and of the PCT OA: BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG and any other State which is a member State of OAPI and a Contracting State of the PCT

PCT REQUEST

PPC10809/SAV

Original (for **SUBMISSION**) - printed on 14.12.1999 10:30:40 AM

V-2	National Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	AE AL AM AT (patent and utility model) AU AZ BA BB BG BR BY CA CH&LI CN CR CU CZ (patent and utility model) DE (patent and utility model) DK (patent and utility model) DM EE (patent and utility model) ES FI (patent and utility model) GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK (patent and utility model) SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW	
V-5	**Precautionary Designation Statement** In addition to the designations made under items V-1, V-2 and V-3, the applicant also makes under Rule 4.9(b) all designations which would be permitted under the PCT except any designation(s) of the State(s) indicated under item V-6 below. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit.		
V-6	**Exclusion(s) from precautionary designations**	NONE	
VI-1	**Priority claim of earlier national application**		
VI-1-1	Filing date	18 December 1998 (18.12.1998)	
VI-1-2	Number	982743	
VI-1-3	Country	FI	
VI-2	**Priority document request** The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s):	VI-1	
VII-1	**International Searching Authority Chosen**	Swedish Patent Office (ISA/SE)	
VIII	**Check list**	number of sheets	electronic file(s) attached
VIII-1	Request	4	-
VIII-2	Description	6	-
VIII-3	Claims	2	-
VIII-4	Abstract	1	ppc10809.txt
VIII-5	Drawings	2	-
VIII-7	TOTAL	15	

PCT REQUEST

PPC10809/SAV

Original (for **SUBMISSION**) - printed on 14.12.1999 10:30:40 AM

	Accompanying items	paper document(s) attached	electronic file(s) attached
VIII-8	Fee calculation sheet	✓	-
VIII-9	Separate signed power of attorney	✓	-
VIII-16	PCT-EASY diskette	-	diskette
VIII-17	Other (specified):	copy of Office Action	-
VIII-18	**Figure of the drawings which should accompany the abstract**	1	
VIII-19	**Language of filing of the international application**	Finnish	
IX-1	**Signature of applicant or agent**	Sinikka Veittola	
IX-1-1	Name	TAMPEREEN PATENTTITOIMISTO OY	
IX-1-2	Name of signatory	Sinikka Veittola	

FOR RECEIVING OFFICE USE ONLY

10-1	**Date of actual receipt of the purported international application**	15 DEC 1999 (15-12-1999)
10-2	**Drawings:**	
10-2-1	Received	
10-2-2	Not received	
10-3	**Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application**	
10-4	**Date of timely receipt of the required corrections under PCT Article 11(2)**	
10-5	**International Searching Authority**	ISA/SE
10-6	**Transmittal of search copy delayed until search fee is paid**	

FOR INTERNATIONAL BUREAU USE ONLY

11-1	**Date of receipt of the record copy by the International Bureau**	26 JANUARY 2000 (26.01.00)

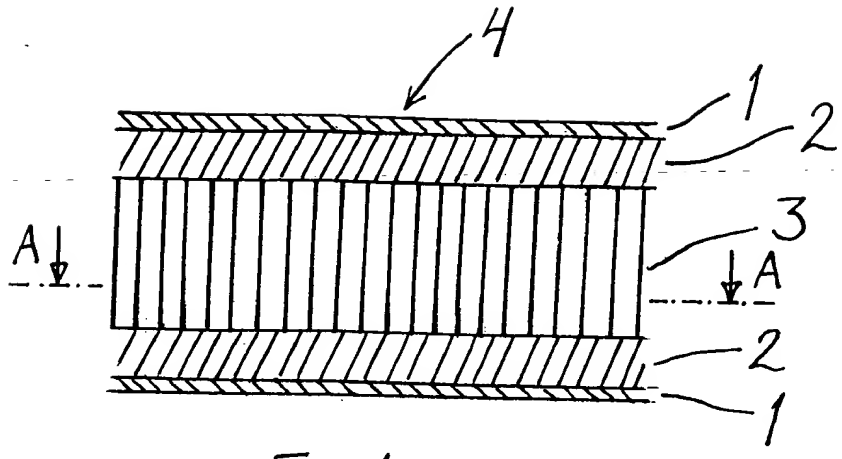


Fig. 1

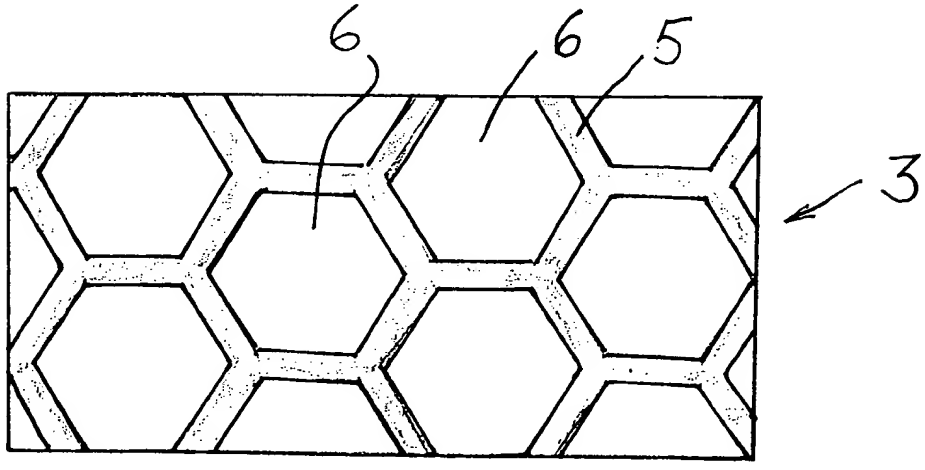


Fig. 2

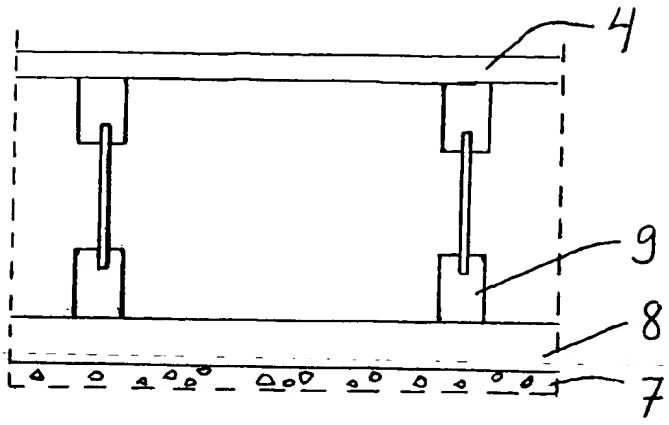


Fig. 3

Keilaradan rakennuselementti ja keilarata

Tämän keksinnön kohteena on keilarata ja sen rakennuselementti. Kyseinen rakennuselementti käsittää laminaattikerroksen, levykerroksen ja tukirakennekerroksen.

Yleensä keilaradat koostuvat alusrakenteesta ja siihen kiinnitetyistä levyistä tai toisiinsa liitetyistä puurimoista. Alusrakenne on tavallisesti puupalkeista muodostettu ristikkorakenne. Yleensä levyjä on useampi päällekkäin, jotta tarvittavat lujuusominaisuudet saavutetaan. Mikäli radan pintamateriaalina käytetään puun sijasta synteettistä materiaalia, päällimmäisen levyn ulkopintaan on tavallisesti kiinnitetty laminaattikerros. Levyt kiinnitetään ruuveilla alusrakenteeseen siten, että elementtien välisten jatkoskohtien korkeusero radan suunnassa saa olla korkeintaan 0.635 mm (1/40").

Keilarata muodostuu vauhdinottoradasta, keilapallon kulkuradasta ja keilapöydästä. Keilaradassa on erilaisia ominaisuuksia vaativia kohtia, jotka täytyy ottaa huomioon rataa suunniteltaessa. Vauhdinottoradan kohdalla radan pitää kestää mm. keilaajan paino, keilapallon kulkuradalla ja keilapöydällä iskunkestävyys ja radan pinnan kitka ovat tärkeitä ominaisuuksia.

Tunnettuja keilaratoja ja keilaradan rakennuselementtejä käsittelevät mm. General Electric Co:n hakemat patentit US 4231573, US 4307883, US 4320898, US 4337290, US 4379553, US 4456253 ja US 4599124 sekä US 4205842. Myös tämän patentin hakija tekee keilaratoja tietyllä tavalla.

Patentit US 4231573, US 4307883, US 4337290, US 4379553, US 4456253 ja US 4599124 esittelevät kaikki samantyyppisen konstruktion, jossa laminaatti kiinnitetään aluslevyn päälle ja näin muodostuu keilaradan päällimmäinen rakennuselementti. Laminaattien ja/tai aluslevyjen materiaali vaihtelee jonkin verran, esimerkiksi patentissa US 4379553 laminaatti on palosuojattu ja patentissa US 4231573 aluslevyksi esitetään mm. betonia. Yleensä aluslevyinä käytetään puupohjaisia levyjä. Patentissa US 4456253 tulee esille kaksipuoleinen raken-

nuselementti, joka on käännettävissä, kun käytössä oleva pinta on kulunut.

Patentissa US 4320898 on hieman erityyppinen ratkaisu keilaradan rakennuselementiksi. Rakennuselementin sisäosa muodostuu puurimoista, jotka on kiinnitetty toisiinsa esimerkiksi liimaamalla tai naulaamalla. Sisäosan puurimojen kosteus on vakioitu ja sisäosa suljetaan ympäristöltä ulkopinnoille kiinnitettävällä laminaatilla ja kulmiin kiinnitettävällä kosteussululla. Rakennuselementti voidaan kiinnittää suoraan alusrakenteen päälle.

Patentti US 4205842 esittelee keilarataratkaisun, jossa keilapallon kulkuradalla rata on muodostettu kuitulevystä, jonka päälle on kiinnitetty laminaatti. Vauhdinottoradalla ja keilapöydällä laminaatti on kiinnitetty jäykkiin levyihin, jotka voivat olla esimerkiksi alumiinia.

Tämän patentin hakija tekee nykyisin keilaradat siten, että puupalkeista tehdyn ristikkorakenteen päälle kiinnitetään kaksi päällekkäin asetettua MDF-levyä ja korkeapainelaminaattilevy, joka on valmistettu hartsilla impregnoidusta paperista. MDF-levyllä tarkoitetaan levyä, jossa puupohjaiset rakenneosat, esimerkiksi kuidut tai puuhake, on käsitelty sideaineella ja muodostettu matoksi ja sen jälkeen puristettu paineen ja lämmön avulla levyiksi.

MDF-levyt asetellaan ristikon päälle niin, että ensimmäisen levykerroksen levyjen saumakohta on eri paikassa kuin toisen levykerroksen levyjen saumakohta. Näin rakenteeseen ei muodostu heikkoja kohtia.

Tunnettujen keilaradan rakennuselementtien ongelmia ovat vaikea koottavuus, painavat elementit, elementtien suhteellisen korkea hinta ja vaikeasta koottavuudesta/purettavuudesta johtuva mitätön jälleenmyyntiarvo. Keilaratojen rakennetta ei ole myöskään optimoitu, vaan tunnetut ratakonstruktiot käsittävät jopa oleellisesti käyttötarkoitukseen nähden liian kestäviä komponentteja, jotka kuitenkin herkästi reagoivat ilmasto-olosuhteiden muutoksiin. Toisaalta taas radan eri osat vaativat erilaisia ominaisuuksia, joten täysin samanlainen ratarakenne joka kohdassa ei ole paras mahdollinen.

Keksinnön mukaisella keilarataelementillä pyritään välttämään tunnettujen keilaratakonstruktioitten ongelmat. Keksinnön mukaiselle keilarataelementille on pääasiassa tunnusomaista se, mitä on esitetty oheisen patenttivaatimuksen 1 tunnusmerkkiosassa.

Keksinnön mukainen keilarataelementti on kevyt, halpa, helppo purkaa, koota ja siirtää, joten sillä on myös jälleenmyyntiarvoa. Se kestää kosteutta ja lämmönvaihteluita paremmin kuin tunnetut keilaratakonstruktiot.

Kyseisiä elementtejä käyttäen keilaratoja voidaan rakentaa myös tilapäiseen käyttöön, esimerkiksi vain määräajan kestäviin tapahtumiin. Elementit voidaan myös rakentaa siten, että niitä voidaan käyttää kumpikin puoli ylöspäin, joten elementit voidaan kääntää, kun toinen puoli on kulunut käyttökelvottomaksi.

Päällekkäisiä levyjä ei tarvita, vaan keilarataelementti voidaan kiinnittää suoraan alusrakenteen päälle. Rataelementin alusrakennetta voidaan myös keventää, koska elementit ovat jäykempiä ja kuormittavat alusrakennetta oleellisesti vähemmän kuin tunnetut ratkaisut. Samoin keilarataelementin eri kerroksien paksuutta vaihtelemalla pitäen vakiona elementin kokonaispaksuuden, saadaan kullekin rataosuudelle vaatimuksiin nähden sopiva rakenne.

Seuraavassa keksinnön mukaista keilarataa ja keilarataelementtiä selostetaan tarkemmin esimerkin avulla viittaamalla oheisiin kuviin:

Kuva 1 esittää keilarataelementin rakennetta.

Kuva 2 esittää kennolevyn rakennetta kuvan 1 mukaisessa poikkileikkauksessa A-A.

Kuva 3 esittää keilaradan rakennetta sivukuvantona.

Keilarata kaikkine laitteineen on varsin monimutkainen konstruktio, jossa radan lisäksi on mm. pallonpalautusjärjestelmä ja keilanpystytys-

kone. Tässä esimerkissä käsitellään kuitenkin vain varsinaisen keilaradan rakennetta.

Kuvan 1 mukainen keilarataelementti, johon kokonaisuudessaan viitataan numerolla 4, muodostuu laminaattikerroksesta 1, levykerroksesta 2 ja tukirakennekerroksesta 3. Esimerkin tapauksessa laminaattikerros 1 on korkeapainelaminaatti, levykerros 2 on puupohjainen levy ja tukirakennekerros 3 on kennolevy.

Korkeapainelaminaatti 1 muodostaa varsinaisen pintarakenteen iskunkestävänä ja riittävän kovana ja sitkeänä kerroksena, jolla on hyvät kitka- ja kulutusominaisuudet. Laminaatin 1 alla on iskurasituksia kantavana kerroksena puupohjainen levy 2, joka on sopivimmin korkeatiheyksistä lastulevyä. Tämän lastulevyn tiheys on edullisesti yli 1000 kg/m^3. Kennolevy 3 omaa korkean ominaisjäykkyyden ja kestää hyvin ilmasto-olosuhteiden (lämpö, kosteus) vaihtelua. Samalla se on kevyt rakenne, joka laskee oleellisesti rataelementin massaa.

Laminaatti 1 on useampikerroksista hartsilla impregnoitua paperia ja se kiinnitetään 5–30 mm paksuun puupohjaiseen levyyn 2. Laminaatin paksuus vaihtelee radan eri osissa, esimerkiksi keilapöydän kohdalla on paksumpi laminaatti 1 johtuen paremman kulutuksenkestävyyden tarpeesta. Niissä kohdissa, missä laminaatti 1 on paksumpaa, puupohjaisen levyn 2 ja/tai kennolevyn 3 pitää olla vastaavasti ohuempaa, jotta rataelementin 4 paksuus kokonaisuudessaan on sama kuin muidenkin rataelementtien paksuus, koska muuten elementtien asennus tulee kohtuuttoman vaikeaksi. Keilaradan mitoituksen lähtökohtana on, että kun elementtiä kuormitetaan 300 kg:n massalla, se ei saa taipua enempää kuin 1,016 mm (4/100"), mikäli alusrakenteessa käytetään 1 metrin jänneväliä.

Laminaatti 1, puupohjainen levy 2 ja kennolevy 3 kiinnitetään toisiinsa sideaineen avulla. Sideaine, jonka pitää olla korkeamoduulinen ja erittäin luja, voi olla liuos-, pasta- tai filmimuodossa.

Kennolevy 3 muodostuu kuvan 2 mukaisesti seinämästä 5, joka erottaa toisistaan seinätyksin toisiinsa liittyvät lokerot 6. Seinämä 5 on alumii-

nia. Kennolevyn paksuus vaihtelee 10–30 mm ja lokeroitten läpimitta voi vaihdella alueella 5–15 mm. Vakiomittoja ovat mm. 6,35 mm (1/4") tai 9,525 mm (3/8"). Tämän esimerkin mukaisen keilarataelementin 4 kennolevynä on käytetty kennolevyä, jossa kennot ovat kuusikulmaisia ns. hunajakennoja. Hunajakennorakenteella saavutetaan oleellisesti tasaiset lujuusominaisuudet suunnasta riippumatta.

Keilarataelementti 4 voidaan rakentaa peilikuvaksi siten, että kennolevyn 3 molemmin puolin on puupohjainen levy 2, jonka ulkopinnalla on laminaatti 1. Tällaisella rakenteella saavutetaan oleellisesti jännityksetön rakenne, joka pysyy alkuperäisessä muodossaan. Samalla saavutetaan se etu, että levy voidaan tarvittaessa kääntää. Keilarataelementin 4 sivut Voidaan sulkea oleellisesti ilmatiiviisti siten, että kosteus- ja lämmönvaihtelut eivät vaikuta keilarataelementtiin 4.

Kuvassa 3 on esitetty keilarata, joka on pystytetty betonilattialle 7. Radan alusrakenne on tehty 45 × 95 mm:n puupalkeista 8, joiden päälle on määrävälein asetettu palkkeja 9, jotka tässä tapauksessa ovat puurakenteisia I-palkkeja. Keilarataelementti 4 on kiinnitetty palkkeihin 9. Vierekkäiset keilarataelementit 4 on kiinnitetty ilman alla olevia levyjä alusrakenteen päälle ainoaksi yhtenäiseksi levykerrokseksi.

Verrattuna laminaattilevystä ja MDF-levyistä rakennettuun keilarataan keksinnön mukaisista rakennuselementeistä 4 rakennetun keilaradan massa on oleellisesti pienempi. Kun rakennuselementissä 4 on alumiininen kennolevy, jonka paksuus on 25,4 mm (1") ja kennojen läpimitta 6,35 mm (1/4") ja molemmin puolin kennolevyä korkeatiheyksistä lastulevyä oleva puupohjainen levy (paksuus 10 mm) ja laminaattilevy (paksuus 3,175 mm), 3,3 m^2 elementin massaksi muodostuu n. 100 kg. Vastaava pinta-ala rakennettuna kahdesta MDF-levystä ja laminaattilevystä painaa 195 kg.

Kennorakenne mahdollistaa myös esimerkiksi jonkin aineen lisäämisen kennoihin. Yksi vaihtoehto on laittaa polyuretaania kennoihin äänieristyksen parantamiseksi.

Alan ammattilaiselle on selvää, että keksintö ei rajoitu edellä esitettyyn esimerkkiin, vaan voi vaihdella jäljempänä esitettyjen patenttivaatimusten puitteissa. Kennolevyn lokeroiden poikkileikkaus voi olla esimerkiksi neliö tai kahdeksankulmio. Kennolevyn materiaali voi olla joku muukin kuin alumiini. On myös mahdollista, että useampi erillinen ontelorakenteinen kappale muodostaa tukirakennekerroksen. Näille kaikille on tyypillistä, että ontelorakenteen seinämät 5 sijaitsevat oleellisesti kohtisuorassa levykerrosten tasoa vastaan eli pystyssä vaakasuorien levykerrosten 3 välissä. Keilaradan alusrakenteena voidaan käyttää jotakin muuta rakennetta kuin edellä esitettyä palkkirakennetta.

Patenttivaatimukset:

1. Keilaradan rakennuselementti (4), joka on tarkoitettu keilaradan pintalevyksi ja joka käsittää ainakin yhden laminaattikerroksen (1), levykerroksen (2) ja tukirakennekerroksen (3), **tunnettu** siitä, että tukirakennekerros (3) on ontelorakenne, joka on muodostettu yhdestä tai useammasta kappaleesta.

2. Edellisen patenttivaatimuksen 1 mukainen rakennuselementti (4), **tunnettu** siitä, että tukirakennekerros (3) on levymäinen materiaali, joka käsittää seinämän (5), joka erottaa seinätyksin toisiinsa liittyvät lokerot (6).

3. Jonkin edellisen patenttivaatimuksen mukainen rakennuselementti (4), **tunnettu** siitä, että lokeron (6) poikkileikkaus on muodoltaan säännöllinen kuusikulmio.

4. Jonkin edellisen patenttivaatimuksen mukainen rakennuselementti (4), **tunnettu** siitä, että tukirakennekerroksen (3) materiaali on alumiinia.

5. Jonkin edellisen patenttivaatimuksen mukainen rakennuselementti (4), **tunnettu** siitä, että levykerros (2) on puupohjainen levy.

6. Jonkin edellisen patenttivaatimuksen mukainen rakennuselementti (4), **tunnettu** siitä, että laminaattikerros (1) on yksi- tai useampikerroksista hartsilla impregnoitua paperia.

7. Jonkin edellisen patenttivaatimuksen mukainen rakennuselementti (4), **tunnettu** siitä, että laminaattikerros (1), levykerros (2) ja tukirakennekerros (3) on liitetty kiinteästi yhteen.

8. Jonkin edellisen patenttivaatimuksen mukainen rakennuselementti (4), **tunnettu** siitä, että rakennuselementti on rakennettu peilisymmetriseksi siten, että tukirakennekerroksen (3) molemmin puolin on levykerros (2) ja molempien levykerrosten (2) ulkopinnalla on laminaattikerros (1).

9. Keilarata, joka käsittää alusrakenteen, joka on muodostettu palkeista (8, 9) ja patenttivaatimuksen 1 mukaisia rakennuselementtejä (4), **tunnettu** siitä, että vierekkäiset rakennuselementit (4) muodostavat keilaradan ainoan levykerroksen alusrakenteen päälle.

10. Patenttivaatimuksen 9 mukainen keilarata, **tunnettu** siitä, että keilaradan rakennuselementtien (4) kerrokset (1, 2, 3) keilaradan eri osissa ovat eri vahvuisia siten, että rakennuselementtien (4) kokonaispaksuus on koko radalla vakio.

(57) Tiivistelmä:

Keilaradan rakennuselementti (4) on tarkoitettu keilaradan pintalevyksi ja se käsittää ainakin yhden laminaattikerroksen (1), levykerroksen (2) ja tukirakennekerroksen (3). Tukirakennekerros (3) on hunajakennon muotoinen ontelorakenne.

Fig. 1